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What is claimed is:

1.   1.   A router for a hierarchical communication network which is
2.   divided into a plurality of areas in each of which a plurality of said router are
3.   interconnected by links, comprising:
4.   a first table having a plurality of entries respectively corresponding to
5.   reachable destinations, each of the entries including an intra-area or an inter-
6.   area indication and an area identifier identifying at least one traversable area;
7.   a plurality of second tables respectively corresponding to said areas,
8.   each of the second tables holding quality-of-service (QoS) values of the links
9.   of the corresponding area; and
10.   a processor, responsive to a request signal specifying a destination and
11.   a QoS value, for making reference to one of the entries of the first table and
12.   one of the second tables corresponding to the specified destination, selecting
13.   links of the area identified by the area identifier of the referenced entry which
14.   links satisfy the specified QoS value, and performing a calculation according
15.   to a shortest path finding algorithm on the selected links to find a shortest
16.   path to the specified destination if the intra-area indication is included in the
17.   referenced entry, or performing said shortest path calculation on the selected
18.   links to find a shortest path tree in the identified area and determining a
19.   route from the shortest path tree.

1.   2.   A router for a hierarchical communication network which is
2.   divided into a plurality of areas in each of which a plurality of said router are
3.   interconnected by links, wherein neighboring ones of said areas are

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4   interconnected by at least one area border router, comprising:

5   a first table having a plurality of entries respectively corresponding to

6   reachable destinations, each of the entries including an intra-area or an inter-

7   area indication, an area identifier identifying at least one traversable area,

8   and a list of area border routers if said inter-area indication is included;

9   a plurality of second tables respectively corresponding to said areas,

10   each of the second tables holding quality-of-service (QoS) values of the links

11   of the corresponding area; and

12   a processor, responsive to a request signal specifying a destination and

13   a QoS value, for making reference to one of the entries of the first table and

14   one of the second tables corresponding to the specified destination, selecting

15   links of the area identified by the area identifier of the referenced entry which

16   links satisfy the specified QoS value, and performing a calculation according

17   to a shortest path finding algorithm on the selected links to find a shortest

18   path to the specified destination if the intra-area indication is included in the

19   referenced entry, or performing said shortest path calculation on the selected

20   links until a shortest path tree is found for all routers of the list of the

21   referenced entry or until an end of the calculation is reached when said tree is

22   not found for all said routers if the inter-area indication is included in the

23   referenced entry, and determining from the shortest path tree a route having

24   an optimum QoS value.

1   3.   The router of claim 1, further comprising a third table

2   corresponding to a destination reachable via at least one traversable area, said

3   third table containing a plurality of router identifiers identifying a plurality of

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4   area border routers and a plurality of QoS values of routes from said plurality

5   of area border routers to the destination, wherein said processor is configured

6   to determine said route depending on said plurality of QoS values.

1   4.   The router of claim 3, wherein said third table further contains a

2   plurality of two hop count values of said routes from said plurality of area

3   border routers to the destination, and wherein said processor is configured to

4   determine said route to one of said plurality of area border routers depending

5   on hop count values of said traversable area plus the hop count values of said

6   third table.

1   5.   A hierarchical communication network which is divided into a

2   plurality of areas in each of which a plurality of said router are

3   interconnected by links, each of said routers comprising:

4   a first table having a plurality of entries respectively corresponding to

5   reachable destinations, each of the entries including an intra-area or an inter-

6   area indication and an area identifier identifying at least one traversable area;

7   a plurality of second tables respectively corresponding to said areas,

8   each of the second tables holding quality-of-service (QoS) values of the links

9   of the corresponding area; and

10   a processor, responsive to a request signal specifying a destination and

11   a QoS value, for making reference to one of the entries of the first table and

12   one of the second tables corresponding to the specified destination, selecting

13   links of the area identified by the area identifier of the referenced entry which

14   links satisfy the specified QoS value, and performing a calculation according

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15   to a shortest path finding algorithm on the selected links to find a shortest

16   path to the specified destination if the intra-area indication is included in the

17   referenced entry, or performing said shortest path calculation on the selected

18   links to find a shortest path tree in the identified area and determining a

19   route from the shortest path tree.

1   6.   A hierarchical communication network which is divided into a

2   plurality of areas in each of which a plurality of routers are interconnected by

3   links, wherein neighboring ones of said areas are interconnected by at least

4   one area border router, each of the routers comprising:

5   a first table having a plurality of entries respectively corresponding to

6   reachable destinations, each of the entries including an intra-area or an inter-

7   area indication, an area identifier identifying at least one traversable area,

8   and a list of area border routers if said inter-area indication is included;

9   a plurality of second tables respectively corresponding to said areas,

10   each of the second tables holding quality-of-service (QoS) values of the links

11   of the corresponding area; and

12   a processor, responsive to a request signal specifying a destination and

13   a QoS value, for making reference to one of the entries of the first table and

14   one of the second tables corresponding to the specified destination, selecting

15   links of the area identified by the area identifier of the referenced entry which

16   links satisfy the specified QoS value, and performing a calculation according

17   to a shortest path finding algorithm on the selected links to find a shortest

18   path to the specified destination if the intra-area indication is included in the

19   referenced entry, or performing said shortest path calculation on the selected

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20   links until a shortest path tree is found for all routers of the list of the

21   referenced entry or until an end of the calculation is reached when said tree is

22   not found for all said routers if the inter-area indication is included in the

23   referenced entry, and determining from the shortest path tree a route having

24   an optimum QoS value.

1   7.   The network of claim 6, wherein each of said routers further

2   comprises a third table corresponding to a destination reachable via at least

3   one traversable area, said third table containing a plurality of router

4   identifiers identifying a plurality of area border routers and a plurality of QoS

5   values of routes from said plurality of area border routers to the destination,

6   wherein said processor is configured to determine said route depending on

7   said plurality of QoS values.

1   8.   The network of claim 7, wherein said third table further

2   contains a plurality of two hop count values of said routes from said plurality

3   of area border routers to the destination, and wherein said processor is

4   configured to determine said route to one of said plurality of area border

5   routers depending on hop count values of said traversable area plus the hop

6   count values of said third table.

1   9.   A routing method for a hierarchical communication network

2   which is divided into a plurality of areas in each of which a plurality of said

3   router are interconnected by links, each of said routers comprising a first

4   table having a plurality of entries respectively corresponding to reachable

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5   destinations, each of the entries including an intra-area or an inter-area

6   indication and an area identifier identifying at least one traversable area, and

7   a plurality of second tables respectively corresponding to said areas, each of

8   the second tables holding quality-of-service (QoS) values of the links of the

9   corresponding area, each of said routers functioning as a source router when

10   a request signal is received, the method comprising the steps of:

11   a)   receiving, at the source router, a request signal specifying a

12   destination and a QoS value and making reference to one of the entries of the

13   first table and one of the second tables corresponding to the specified

14   destination;

15   b)   selecting links of the area identified by the area identifier of the

16   referenced entry which links satisfy the specified QoS value; and

17   c)   performing a calculation according to a shortest path finding

18   algorithm on the selected links to find a shortest path to the specified

19   destination if the intra-area indication is included in the referenced entry, or

20   performing said shortest path calculation on the selected links to find a

21   shortest path tree in the identified area and determining a route from the

22   shortest path tree.

1   10.   A routing method for a hierarchical communication network

2   which is divided into a plurality of areas in each of which a plurality of

3   routers are interconnected by links, the routers of neighboring areas being

4   interconnected by at least one area border router, wherein each of the routers

5   functions as a source router when a request signal is received and includes a

6   first table having a plurality of entries respectively corresponding to

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7   reachable destinations, each of the entries including an intra-area or an inter-

8   area indication, an area identifier identifying at least one traversable area,

9   and a list of area border routers if said inter-area indication is included, and a

10   plurality of second tables respectively corresponding to said areas, each of the

11   second tables holding quality-of-service (QoS) values of the links of the

12   corresponding area, the method comprising the steps of:

13   a)   receiving, at said source router, a request signal specifying a

14   destination and a QoS value, for making reference to one of the entries of the

15   first table and one of the second tables corresponding to the specified

16   destination;

17   b)   selecting links of the area identified by the area identifier of the

18   referenced entry which links satisfy the specified QoS value; and

19   c)   performing a calculation according to a shortest path finding

20   algorithm on the selected links to find a shortest path to the specified

21   destination if the intra-area indication is included in the referenced entry, or

22   performing said shortest path calculation on the selected links until a shortest

23   path tree is found for all routers of the list of the referenced entry or until an

24   end of the calculation is reached when said tree is not found for all said

25   routers if the inter-area indication is included in the referenced entry, and

26   determining from the shortest path tree a route having an optimum QoS

27   value.

1   11.   The method of claim 10, wherein each of said routers further

2   comprises a third table corresponding to a destination reachable via at least

3   one traversable area from said source router, said third table containing a

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4   plurality of router identifiers identifying a plurality of area border routers

5   and a plurality of QoS values of routes from said plurality of area border

6   routers to the destination, wherein the step (c) determines said route

7   depending on said plurality of QoS values.

1   12.   The method of claim 11, wherein said third table further

2   contains a plurality of two hop count values of said routes from said plurality

3   of area border routers to the destination, and wherein the step (c) comprises

4   the step of determining said route to one of said plurality of area border

5   routers depending on hop count values of said traversable area plus the hop

6   count values of said third table.